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# THE TRACK OF EVOLUTION

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IN a recent talk with a friend about the lack of sympathy between the workers in physical and social science he asked, "What contribution since that of Malthus has been worthy of consideration?" Malthus, he admitted, helped to arouse the leaders of biologic thought, but who, he asked, had given a definite contribution since that time? The question demands an answer, or at least some discussion of the points involved. It must be admitted that the economists are defective both in their reasoning and in their psychology, but it should also be recognized that there were obstacles to the use of objective measurements in social science which were hard to surmount. Until the pathway is cleared objective measurements, while seeming to add to the clearness of thought, have in reality added to its confusion and furnished more meager results than did a legitimate use of older methods. There have been endeavors to use the method of physical science, but real students have found that beneath the formula taken from mathematics or physics lay hazy ideas and a species of dogmatism that prevented an open-minded consideration of the facts. Every crank, and his name is legion, poses as a scientist and has his formulæ modeled after the latest statement of scientific truth, but this pretense has only been a cloak for ignorance and dogma. If the scientist suspects the economist, the economist in turn suspects the new-comer who trades in the symbols of physical science. Some progress has thus been made even if the results are not so definite as those of physical science.

The defects in the social sciences are due to the imperfections in the physical sciences on which they are based. The economist must follow, not precede, the physical scientist? If the economist fails the original fault is not with him, but in the partial development of the sciences on which he depends. Subjective standards have been adhered to because of the lack of objective data. In many fields one has to choose between making physical science and falling back on the loose basis of thought on which the older economic science rested. It is no wonder that under these conditions economics has failed in its main mission and its workers are compelled to endure the sneers of those in more fortunate fields of work.

Were I thinking only of making this complaint I would have remained silent. There seems of late some alterations in related sciences raising the hope that a new epoch has come in which the social and physical sciences may cooperate for a common advance. The route to this understanding I shall point out both as to where agreement has been reached and where a gulf still remains. Economic change must be one of a group of changes each of which is an essential step in progressive evolution in order that its conclusions may be put on a par with other contributions. I found that a start could be made in this direction, but no full solution was possible while certain views of physical science persisted. The law of diminishing returns assumes that men have a few stable wants, in the satisfaction of which a keen and destructive struggle arises. The increasing demand for any commodity causes an extension of its production to a point when diminishing returns begin. Men, however, gain relief by changing their wants and thus bringing into use new natural forces. An evolution is thus forced from old objects of consumption to the new, and from objects of which nature is less productive to those of which the yield is more generous. Potatoes and sugar may displace meat and wheat bread. I had little difficulty in proving this point, but the next step was blocked by a supposed physiological principle. It was contended that the cheap food made a low type of man. The rare foods like meat and bread stimulated a higher sort of energy and gave to those who use them a physical and mental superiority that was decisive in every world contest. The Irish potato-eater was doomed to a subordinate position in comparison to the English, who used a more costly food. Economic progress and physical progress were thus put in opposition.

This obstacle no longer exists, or at least is in a fair way to be removed. The cheaper foods have of late proved their worth. The vigor coming from the use of meat is in no way superior to that of bread, potatoes, or rice. If but one article or some few articles were used, wheat bread and meat might prove their superiority to the potato or rice; but as the variety of food increases the deficiencies of each sort of cheap food are made up by the excellence of some other food. The cheaper diet as a whole proves its superiority over the old meat and bread diet.

The prevailing theory of the past also assumed that to be well-nourished and prosperous led to indulgence, dissipation, and degeneration. The strong, vigorous person was assumed to be he who was somewhat underfed, or at least so poor that overindulgence was impossible. There is a measure of truth in this view, as also there is in the statement that the users of dear food, bread and meat, have been the superior races. By heredity our stomachs are used to coarse food. The primitive man could only occasionally secure the concentrated food the prosperous now use. He faced periods of actual starvation each year, and thus the indulgence of one season had its influence counteracted by the want of another. Our stomach troubles are due to a change to a concentrated diet, a change which was promoted by the belief that the dearer foods gave a superior energy to that derived from cheap foods. The measure of energy is not the quantity of food taken into the stomach, but the quantity of pure blood that results from the digestive process. There are also numerous glands the right action of which is an element in blood values. The best food when eaten too freely may be turned into toxins, and thus be harmful instead of beneficial. This is especially true of meat foods, which are so liable to be transformed into noxious compounds.

The word toxin describes the injurious contents of the blood, but we have no term that designates its beneficial contents. We talk in terms of fat, oxygen, protein and carbohydrates, but stop when the peculiar function of each has been described. To supply this gap and to enable me to state my theory in simple terms I shall call all the ingredients of the blood that promote activity "nutrins," and thus make a clear contrast between the nutrins that increase energy and the toxins that depress it. The man improves as the nutrins in the blood increase. High-priced food, indigestion, and toxins represent the elements adverse to the growth of energy, while cheap food, a varied diet, and more nutrins are its upbuilding forces. We can, if we will, study each of these elements by the method of physical science and remedy each defect. Much has been done in all these fields in recent years. The war has forced each nation to solve its food problem, and to make the people's consumption of food harmonize with known facts.

"Consciousness," says a recent writer, "is a response to environmental stimuli." The environment excites the nerves, and nerve evokes consciousness. This theory has come down to us from the time of Locke, and is the standard explanation of psychic phenomena. The mind is a blank except as it gets a content through nerve excitation. These nerves are a biological inheritance, a mechanism that has taken ages to develop. By them the external stimuli and the internal response are brought into harmony. Are they the source of this internal response, or do they merely direct a pulse that has an independent origin? Is consciousness a chemical transformation or a biological mechanism? Are its antecedents in the blood or in nerve irritation? The best answer to these questions comes from watching the action of glands and in measuring their influence in creating states of consciousness. The glands accumulate their material and either overflow by the increasing pressure of their content or discharge as the result of nerve stimuli. If it is a self-discharge we dream; if the discharge results from nervous stimuli thought becomes logical and adjustive. The nerves are thus a mechanism not for creating consciousness, but for making thought currents run parallel to external events. They conserve life, but they are not its source.

If this explanation is correct the antecedent to consciousness is a gland discharge creating a pulse that becomes thought through the nerve mechanisms turning the pulse into motor power. The content of a gland is like the steam in a boiler, which by itself merely has explosive power, but which by the mechanisms of the engine is transformed into a steady working force. Nerve development, like improvements in the engine, increases adjustment as the engine creates force, but in neither case are they the seat of the ultimate power. No explanation of movement is possible in terms of engines or nerves. This is readily seen in the case of an engine. Is it not equally true of nerves?

Bear in mind that this is not an attempt to explain consciousness without nerves, but an endeavor to show that explanations of consciousness merely in terms of nerves is doomed to failure. Such explanations lack the true starting point and hence fail to connect consciousness with its chemical antecedents in the blood. From blood to gland, from gland to pulse, and from pulse to nerve reaction is the series through which our life processes go. The pulse in terms of consciousness is emotion; nerve excitation becomes ideas. When the two blend we have the higher life for which we yearn. Each pulse starts as emotion and is transformed into clear thought as the various nerve reactions determine the channel in which it moves. If this be true, dreams and wishes represent the early stages of thought movement when the emotional pulse is dominant. The clue to their origin lies in emotions that are non-adjustive, and not in the useful reactions which harmonize life with its environment. We must start with the glands and connect them with dreams and wishes.

If sex discharges result in sex dreams we have a ready means of connecting gland activity with conscious emotion. Even if it be admitted that some dreams are not sex dreams they undoubtedly are the most elementary of our dreams. Here plainly a discharge antedates consciousness and colors its content. The philosopher Kant claimed that space and time were subjective forms, and thus the ultimates of thought. It would be nearer the truth to say that sex images are thought's ultimates. The pulse starts in a movement towards sex images, and would end there if our inherited nerve mechanisms did not censor the pulse and force it in other directions. Conscious thought has a foundation in sex but a superstructure of sense impressions. The external elements are magnified because of their usefulness, while the internal are distorted or suppressed.

It is worth asking how perfect these sex images would be if no sense impressions came from the outside to make them definite and clear. Our dreams are not purely subjective. Suppose a healthy child should grow up with no sensory nerves to bring in external impressions, but with perfect gland activity and a well-developed sympathetic nerve system, what pictures would accompany its sex discharges? How far could it go towards creating definite images? What this child could do would show the pulse forms as contrasted to the content due to sense impressions. We thus come to a problem akin to that of Kant. Thought would be a combination of pulse forms and sense data, but these forms would not be transcendental in origin, but the result of sex evolution. Each clear thought would be partly pulse and partly sense; the vital element would be in the one, the utility in the other. The elements of the dream are beneath our waking thought, but its sense content is so fully overlaid that the dream element is confused with the inflowing sense impressions. Though censored and depleted, the dream form exists and is the vital antecedent in all our thought. The nerves dominate, but they do not originate.

This view involves a type of thinking that is old, for it assumes there are native elements in mental activity not derived from the senses. Instead of a blank mind there are inherited mechanisms which determine the types of thinking. But these forms are not transcendental, nor do they need external stimuli to excite their activity. The forms of thought are independent of and antecedent to the concrete additions that come from sensory sources. The new view differs from the old in not starting from abstract concepts like space and time, but from concrete images due to sex and fear. Both sex and fear images are evoked by internal awakenings and not by external data. Here are origins of thought that heredity could create, and if they are given the more abstract relations could be readily derived from them. It is customary to describe sex imagery as instinctive, but this is merely to name it without giving any explanation. Animals do things with precision for which they have no experience to guide them. Are they merely mechanical reactions or are these animals aided by a picture of the act by some inherited mechanism? Can they dream of what they are to do as men dream? Can they wish and thus anticipate events, or does some blind force drive them to their deeds? To give animals a dream life accords with what we know of our mental activity and breaks down a barrier between their thought and ours. Sex and fear are elements in all conscious life. Is it likely that the imagery they evoke appeared only in human beings? Is it not more probable that their anticipatory dream life is more specific than ours, and thus is more of an aid in the necessary acts on which their lives depend?

Be this as it may, certainly the wish with man goes before the act, and the wish in turn must have a visual antecedent by which it is aroused. These antecedents need not be definite. There is no need of having the power of throwing a beautiful woman on the mental screen to make sex wishes a force. But the elements of form and beauty must be there which slight additions from external sources make definite enough to direct sex wishes. Beauty is light and color attached to some object. But the origin of our concepts of beauty and worship shows simpler objects than woman first arouse our admiration. Men worship light, movement and color in their earlier religion and seek to identify themselves with these primal elements. They also worship a sun god before they are aware of a God of Justice. The light, the heat, the sound, the highly colored, the oval, the disk, the awesome, are early objects of appreciation. All these an inherited mechanism could form for us independent of sense impressions. The series in a sex dream may be thus described—first a bright spot, then a highly colored view which draws the observer to it by a magical force, the view becomes a landscape above the horizon of which the sun appears. The sun becomes a god, a hero, or some familiar form of super life. Memories, judgments, and censorships play a more effective part as the dream proceeds. And yet its course is fairly constant, and from it we can recognize the internal elements that through heredity antedate our sense impressions.

The path of a fear dream is equally clear. It starts with a dark spot or cloud which turns into objects of terror as they approach. Movement is suspended and vain endeavors to escape are made. Then comes a falling sensation. A bottomless pit opens up, but before the bottom is reached the spell is broken and the dreamer awakes. Here we again have a series that an inherited mechanism could produce. As with sex dreams external elements are readily admitted into the picture and blended with it, but the essentials come not from external impressions but from internal sources. They represent discharges due to pressure, and not nerve reactions excited by external stimuli. It is not difficult to separate the effects of pressure discharge from nerve reaction if we once get the key to their explanation. The antecedent of the one is in the blood, while the other has its origin in the nerve cells. When the two blend we have conscious thought. They are isolated only in dream life.

If we think of consciousness as gland discharge we have a high or low threshold of consciousness as the pressure is great or less. The high pressure gives a bright coloring to our emotions, and from them the sex series starts which we interpret in terms of light, the sun, God, and beauty, with woman at the end of the series. The low pressure in contrast to this gives black spots and heavy moving lines. These become snakes, bears, dragons, demons, as we increase the indefiniteness of our interpretation. For several years I was troubled with dizziness and am therefore familiar with the elementary images due to a low threshold of consciousness. A slight attack makes external objects seem to whirl. With a worse attack heavy black lines fly about in the field of consciousness. These a diseased mind mistakes for snakes. If the attack becomes worse, darkness engulfs and an unconscious epoch follows. It is these dark pictures that we associate with evil. The bad is always pictured with heavy black lines, and thus seems hideous. In reality, however, it is the beautiful woman who is the tempter, while the homely woman is the saint. Could there be better evidence than this to show that our dream images are due to inherited mechanism and not to sense experience?

This proof can be carried a step farther by analyzing the content of the glands when pressure forces their discharge. If the content is toxic a low threshold of consciousness results, with the wiggley lines which readily turn into snakes and dragons. If the gland content is nutric a high threshold results, with light, beauty, God, and woman. The two series flow from the two levels of consciousness, and each has an independent mechanism due to heredity. The two flows of conscious pulse intermingle in many ways, and out of this comes the complexity of emotion and thought. There are, however, four elementary movements, one of which can be recognized in any thought movement.

The simple movements are from light to sun, power, and sex, or from dark lines to snakes and demons. Changes, however, can be made suddenly from one level to the other, from which a complex movement results. The bad pictures may suddenly be changed to bright ones, and then we get the concept of hero, Saviour or Redeemer. Or the movement may start on the higher level and then dip down to the lower level. We then have a crisis out of which the thought of self-sacrifice comes. If we picture these in terms of gland activity any of these movements could readily result, and thus an explanation given that does not involve any mysterious elements. When we understand the transformations of the blood, the discharge of glands and the action of toxins and nutrins, each step can be readily followed and the antecedents of consciousness correctly presented.

If light has been thrown on the physical mechanism antecedent to emotion, the next step is to offer some explanation of the nature of a wish. Wishes are emotion directed to some sensory end. A wish is thus not pure emotion, but emotion mechanically directed to some object. Dr. Freud has been a great aid in separating wishes from pure emotion on the one hand, and from motor activity on the other. We must now ask whether wishes are to be regarded as a nutric discharge or a nervous reaction. The best answer to this are our appetites. The mere sight of food arouses not merely a wish for food, but a gastric flow in the organs where food is digested. The gastric flow does not depend on food contacts, but on food wishes. If gastric flows and food wishes occur together, is it not a simpler explanation to say that the flow is the cause of the wish than to seek an independent origin for wishes? And if this type of wishes has gland discharges as its origin, need we look farther for the source of other wishes? A dream would then be a form of gland overflow, while the wish is the same discharge excited by external stimuli. The wish thus has a direction which dreams lack. Good dreams and good wishes have their origin in these pressure overflows. Bad dreams and depressing fears arise from some toxin in this discharge. The failure to discharge and the overflow start mental activity each of its own kind.

The same reasoning would explain why our dreams are wishes and why repressed action tends to become the content of our dream life. In action we drain the surplus flow from the glands aroused. A refusal to act leaves the glands of the repressed parts full to the point of overflow. We go to sleep with the dominant part of our waking selves drained of its surplus while the repressed parts are full to overflow. Is it a wonder that when the drained parts are recovering their surplus in sleep that the unused parts should overflow and send our emotions along forbidden paths? The sleeping self reverses the waking self because the exhausted parts lose their dominance, and thus their power to censor.

It is not claimed that the preceding discussion has cleared away the difficulties of a rational explanation of consciousness, but it is hoped that a viewpoint is attained through making such a solution possible. Nerve psychology explains how consciousness is aroused rather than its physical antecedents. If the antecedent of conscious action is a discharge and not a nerve reaction; if it is a chemical change in the blood rather than an inherited nervous mechanism, the physical basis of consciousness can be traced through the steps from the intake of food to the result in action. The food becomes blood, and blood becomes nutrins or toxins. They accumulate in unused glands which discharge either through pressure or nervous excitation. These discharges arouse emotions which excite dreams if the discharge is through pressure, and conscious thought if the discharge results from some nerve stimulation. The nerves thus direct consciousness, but do not create it.

I have stated the contrast between the action of nerve and gland to bring out the elementary function of each. To ask whether the antecedents of consciousness lie in the sympathetic or sensory nerves would involve the same points as to ask its relation to glands and nerves. The sympathetic system controls gland action, while the sensory system directs motor action. The one represents life processes, the other those of adjustment. It is needless to ask what consciousness is or where is its seat. We can, however, learn what physical processes precede and what follow its appearance. This is what I mean by the track of evolution. Improvements start in economic changes reducing the cost of food, saving waste, and in increasing personal efficiency. A group of acquired characters is thus created which become inherited traits only by the slow process of physical evolution. The stomach, the blood, the gland, and the sensory nerve are gradually transformed into more effective means of promoting evolution. Through them we increase our knowledge of external processes from which new economies in food and greater personal efficiency result. In this way an economic theory of progress becomes a complement to current biologic theories, and together they give a clearer view of evolution than either in isolation presents.